

In the name of Allah, the Most Gracious, the Most Merciful



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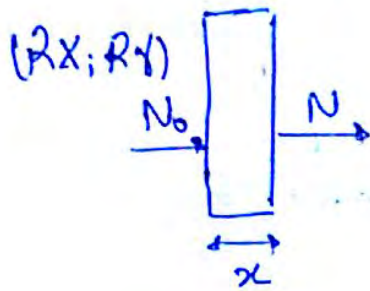
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CHEKROUNI Atténuation ABIR :)



$$N = N_0 e^{-\mu x}$$

μ : coeff linéaire d'atténuation.
(matériau, énergie photon)

- Couche de demi atténuation \bar{x} :
(CDA)

$$\bar{x} \Rightarrow N = \frac{N_0}{2}$$

$$\bar{x} = \frac{\ln 2}{\mu}$$

- Libre parcours parcouru moyen x_L :

$$x_L \Rightarrow N = \frac{N_0}{e}$$

$$x_L = \frac{1}{\mu}$$

- Coefficient massique d'atténuation

$$\mu_m = \frac{\mu}{\rho} \quad \text{coeff linéaire}$$

$$[\mu_m] = \text{cm}^2/\text{g}$$

ρ : masse volumique

$$A = \frac{N_0 - N}{N_0}$$

Le Noyau

- Types de noyaux:

* Isotones \rightarrow même A.

* Isobares \rightarrow même N.

* Isotopes \rightarrow même Z.

* Isomères \rightarrow même A
même Z
niveaux d'E \neq

Le rayon d'un noyau est donné par:

$$R = r_0 A^{1/3}$$

$$r_0 = 1,5 \cdot 10^{-15} \text{ m.}$$

Défaut de masse:

$$\Delta m = Z m_p + (A - Z) m_n - M_{\text{noy}}$$

Energie de liaison:

$$E_L = \Delta m c^2$$

Energie de liaison moyenne:

$$E_{L\text{ moy}} = \frac{B_e}{A}$$

$$1 \text{ uma} = 1,66 \cdot 10^{-27} \text{ Kg.}$$

$$\Rightarrow E_L = 931,5 \text{ Mev.}$$

Radioactivité

Loi de désintégration:

$$N = N_0 e^{-\lambda t}$$

$$A = A_0 e^{-\lambda t}$$

λ = constante radioactive.

$$[\lambda] = \text{s}^{-1}$$

La période T:

$$t = T \Rightarrow N = \frac{N_0}{2}$$

$$T = \frac{\ln 2}{\lambda}$$

La vie moyenne τ :

$$\tau = \frac{1}{\lambda}$$

l'activité A:

$$A = \lambda N$$

$$[A] \equiv \frac{\text{des}}{\text{s}} \text{ ou Bq.}$$

$$1 \text{ Ci} = 3,7 \cdot 10^{10} \text{ Bq.}$$

$$N = N_0 \left(\frac{1}{2}\right)^{t/T}$$

Dans une réaction nucléaire
il y a ~~conservation~~ conservation
de A et Z et de la Quantité
de mouvement.

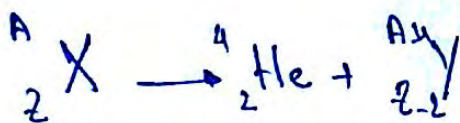
Quantité de mouvement:

$$Q = [m_x - m_y - m_{\text{pu}}] \cdot c^2$$

$$Q = E_{cy} + E_{c\text{pu}} + E_y$$

* Réaction α ($\alpha = {}^4_2\text{He}$)

$Z > 82$

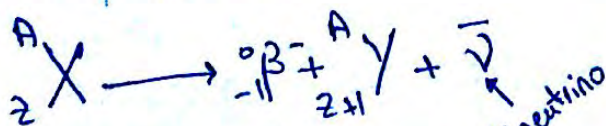


$$Q = [m_x - m_\alpha - m_y] \cdot c^2$$

$$Q = E_{cy} + E_{c\alpha}$$

$$m_\alpha \cdot E_{c\alpha} = m_y \cdot E_{cy}$$

* Réaction β^-

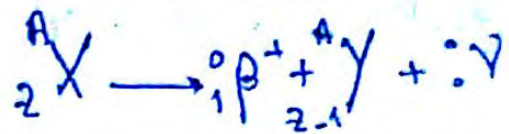


$\bar{\nu}$ antineutrino

$$Q = [m_x - m_e - m_y] \cdot c^2$$

$$Q = E_{c\beta^-} + E_{c\bar{\nu}}$$

* Réaction β^+

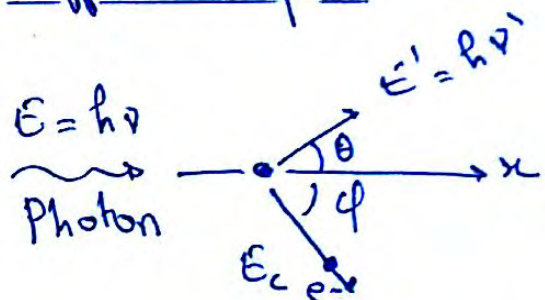


$$\begin{cases} Q = (m_x - m_0 - m_y) c^2 \\ Q = E_{c\beta^+} + E_{c\nu} \end{cases}$$

* Réaction γ



Effet Compton:

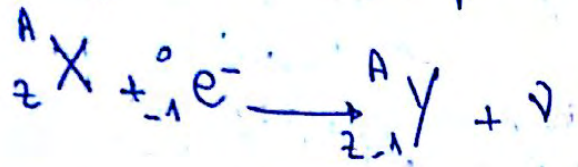


$$\lambda' - \lambda = \frac{h}{m_0 c} (1 - \cos \theta)$$

$$\lambda_c = \frac{h}{m_0 c} = 0,0242 \text{ \AA}$$

$$\tan \phi = \frac{\tan' (Q/2)}{1 + \frac{h\nu}{E_0} e^-}$$

Capture électronique



$$\begin{cases} Q = (M_X + m_0 - m_Y)c^2 \\ Q = E_{\gamma} \end{cases}$$